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June 6, 1988
JPN-88-026

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, D.C. 20555

SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
MARK I Containment Severe Accident Information

Reference: NRC letter, H. Abelson to J. C. Brons (NYPA), dated May 24, 1988, concerning the same subject.

Dear Sir:

The referenced letter requested that the Authority provide FitzPatrick specific information for NRC use in evaluating Mark I containments. This information is contained in Attachments A through F to this letter, corresponding to subjects A through F in the enclosure to the referenced letter.

The questions posed by the NRC in the referenced letter are not very specific and had to be interpreted in order to prepare a response. Notwithstanding a June 3, 1988, telecon with the cognizant NRC technical staff, a severe accident has not been defined or quantified. Therefore this response addresses events beyond the design basis which are unspecified as to nature, initiation, scenario and duration. Where practical, NUREG-1150 results are used as a source of information regarding dominant event sequences (e.g., ATWS and SBO). As discussed in the June 3 telecon, this response primarily considers systems and flow alignments that are not specifically addressed in the FitzPatrick FSAR.

Due to the extremely short response time requested by the NRC, this information has not undergone the detailed verification and quality control process that is normally applied to information submitted to the NRC.

Should you or your staff have any questions regarding this matter, please contact Mr. J. A. Gray, Jr. of my staff.

Very truly yours,

John C. Brons
Executive Vice President
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cc: U.S. Nuclear Regulatory Commission
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ATTACHMENT A

MARK I CONTAINMENT PROGRAM

The FitzPatrick Nuclear Power Plant has many diverse systems for injecting water into the reactor and containment under accident conditions. Sources of water include on-site tanks (e.g., suppression pool, condensate storage tanks, condenser hotwell, and several storage tanks) and off-site sources (e.g., Lake Ontario, Oswego Fire dept., and Oswego City water). Injection pumps include Engineered Safeguards (e.g., RHR, Core Spray, HPCI, and Standby Liquid Control) and balance of plant (e.g., Condensate, Feedwater, Control Rod Drive, and Fire suppression) pumps. Through combinations of suction paths, pumps, and discharge paths, at least 60 distinct flowpaths are available for post-accident injection through the systems listed below.

REACTOR VESSEL INJECTION

I. Residual Heat Removal (RHR) LPCI mode [NOTES 1 & 2]

1. Power Source: Safety related 4kV buses
   4 pumps, A & B pump powered from A & C EDG
   C & D pump powered from B & D EDG

2. Rated Flow and Pressure: 10,000 gpm/pump @ 20 psig Rx press.
   7,700 gpm/pump @ 433 Ft. dynamic head (design)

3. Water Source: Suppression Pool (~800,000 gal.)

4. Valve Power: Emergency AC (EDG) and dedicated safety-related independant power supply (battery and inverter)

5. Manual Valves: N/A

6. Containment connection: Dedicated penetration (no connection required)

II. RHR Head Spray [NOTE 1]

1. Power Source: Safety related 4kV buses
   2 pumps, B & D RHR pumps (see I. above)

2. Rated Flow and Pressure: 625 gpm @ Reactor pressure of 50 psig

3. Water Source: (see I. above)

4. Valve Power: "

5. Manual Valves: "

6. Containment connection: "

III. Core Spray

1. Power Source: Safety related 4kV buses
   2 pumps, A pump powered from A & C EDG
   B pump powered from B & D EDG

2. Rated Flow and Pressure: 4,625 gpm/pump @ 113 psig Rx press.
4,700 gpm @ 670 Ft. (design)

3. Water Source: a) Suppression Pool (~800,000 gal.)
b) CST's (upper half, max. 100,000 gal/tank)

4. Valve Power: a) Emergency AC
b) Emergency AC and Manual Valve

5. Manual Valves: b) Located local to pump in cresent area.
Requires assess to secondary containment.

6. Containment connection: Dedicated penetration (no connection required)

IV. High Pressure Coolant Injection (HPCI)

1. Power Source: Steam from Reactor (Decay heat and Sensible heat)

2. Rated Flow and Pressure: 4,250 gpm @ Rx. pressure between 1,120 and 150 psig

3. Water Source: a) CST (2 tanks @ 200,000 each, 100,000 per tank reserved for HPCI and RCIC)
b) Suppression Pool (~800,000 gal - auto swap from CST to SP)

4. Valve Power: Emergency AC and Emergency DC

5. Manual Valves: N/A

6. Containment connection: Through Feedwater (no connection required)

V. Reactor Core Isolation Cooling (RCIC)

1. Power Source: (See IV. above)

2. Rated Flow and Pressure: 400 gpm @ Rx. pressure between 1,120 and 150 psig

3. Water Source: (See IV. above)

4. Valve Power: "

5. Manual Valves: "

6. Containment connection: "

VI. Condensate

1. Power Source: 3 pumps powered from normal station generator,
(2 of which can also be powered from off-site sources)

2. Rated Flow and Pressure: 8,066 gpm/pump @ 150 psig (459 Ft.)

3. Water Source: Condenser Hotwell (norm ~100,000 gal, auto level control with make-up from CST and emergency make-up from the demineralized water storage tank)

4. Valve Power: Normal AC (air required for hotwell make-up) Positioned for injection during normal ops.

5. Manual Valves: N/A for injection

6. Containment connection: Through Feedwater (no connection required)

VII. Condensate Booster

1. Power Source: 3 pumps powered from normal station generator, (2 of which can also be powered from off-site sources)

2. Rated Flow and Pressure: 8,066 gpm/pump @ 737 psi (1,100 Ft.)

3. Water Source: Discharge of Condensate Pumps (VI. above)

4. Valve Power: Normal AC, Positioned for injection during normal plant operation.

5. Manual Valves: N/A for injection

6. Containment connection: Through Feedwater (no connection required)

VIII. Feedwater

1. Power Source: Turbine driven by steam from Reactor (MSIV's open)

2. Rated Flow and Pressure: 2 pumps 13,750 gpm/pump @ 1,227 psig

3. Water Source: Discharge of Condensate Booster Pumps (VII above)

4. Valve Power: Normal AC, Positioned for injection during normal plant operation.

5. Manual Valves: N/A for injection

6. Containment connection: Dedicated penetration (no connection required)

IX. Standby Liquid Control (SLC)

1. Power Source: Safety related 600V buses
2 pumps, A pump powered from A & C EDG
B pump powered from B & D EDG

2. Rated Flow and Pressure: 39-62 gpm/pump @ 1,500 psig

3. Water Source: Boron solution from dedicated tank (~4,000 gal)
Tank make-up and/or alternate suction from demineralized water transfer (see XVIII. below)

4. Valve Power: a) Emergency AC and explosive (emergency AC trigger)
b) Tank make-up and alternate suction via manual valves.

5. Manual Valves: b) Requires access to secondary containment

6. Containment connection: Dedicated penetration (no connection required)

X. Control Rod Drive (CRD)

1. Power Source: Safety related 600V buses
2 pumps, A pump powered from A & C EDG
B pump powered from B & D EDG

2. Rated Flow and Pressure: 97 gpm/pump @ 1,750 psig (rated)
59 gpm @ 1,250 psig (normal)

3. Water Source:
a) Discharge of Condensate Pump (VI. above)
b) Discharge of Demin Transfer Pump (see XVIII. below)
c) CST's (upper half, max. 100,000 gal/tank)
d) SLC tank. (IX. above)

4. Valve Power: Flow rate (and injection path) controlled by Air operated valve. Upon loss of air, the charging water header becomes the only flow path. If a scram signal is present, the scram valves will be open, providing an injection flow path.

5. Manual Valves:
a,b,c) N/A for injection
d) Manual hook-up - hard pipe flow path. Access to secondary containment required.

6. Containment connection: Dedicated penetration (no connection required)

XI. Condensate Transfer

1. Power Source: 2 pumps powered from off-site sources

2. Rated Flow and Pressure: 600 gpm/pump, 330 Ft. max total head

3. Water Source: CST's (upper half, max. 100,000 gal/tank)

4. Valve Power: N/A (normally open manual valves)

5. Manual Valves: N/A

6. Containment connection: Injects through RHR and Core Spray keep full piping. Actual injection flowrate unknown. (see I. and III. above for RHR and Core Spray data)

CONTAINMENT INJECTION

XII. RHR Drywell Spray [NOTE 1]

1. Power Source: (see I. above)

2. Rated Flow and Pressure: 19,950 gpm w/ 2 RHR pumps @ >200 psig

3. Water Source: (see I. above)

4. Valve Power: "

5. Manual Valves: "

6. Containment connection: "

XIII. RHR Torus Spray [NOTE 1]

1. Power Source: (see I. above)
2. Rated Flow and Pressure: 600 gpm @ >200 psig
3. Water Source: (see I. above)
4. Valve Power: "
5. Manual Valves: "
6. Containment connection: "

XIV. Torus Fill and Make-up [NOTE 3]

1. Power Source: Gravity drain from CST's
2. Rated Flow and Pressure: ???
3. Water Source: CST's (upper half, max. 100,000 gal/tank)
4. Valve Power: Manual
5. Manual Valves: Secondary Containment access required
6. Containment connection: Dedicated penetration (no connection required)

OTHER INJECTION SOURCES

XV. RHR Service Water Cross-tie [NOTE 4]

1. Power Source: Safety related 4kV buses
   4 pumps, A & C pump powered from A & C EDG
   B & D pump powered from B & D EDG
2. Rated Flow and Pressure: 4,000 gpm/pump @ >100 psig
3. Water Source: Lake Ontario (infinite) through safety-related intake structure
4. Valve Power: Emergency AC (EDG) and dedicated safety-related independant power supply (battery and inverter)
5. Manual Valves: N/A
6. Containment connection: Through RHR (I. above)

XVI. Diesel Fire Pump

1. Power Source: Diesel engine. Dedicated diesel fuel tank and starter battery
2. Rated Flow and Pressure: 2,500 gpm @ 125 psig
3. Water Source: (see XV.3. above)

4. Valve Power: Manual hose coupling connection to RHR service water piping. Additional valves are in RHR and RHR service water systems (I. and XV. above)

5. Manual Valves: Manual connection located in screenwell - accessible under severe accident conditions.

6. Containment connection: Through RHR (I. above)

XVII. Local Fire Department

1. Power Source: Diesel driven pumper truck. Parked on road between lake bluffs and Screenwell building.

2. Rated Flow and Pressure: ???

3. Water Source: Infinite (Lake Ontario via hose)

4. Valve Power: Manual hose coupling connection to RHR service water piping (XV. above). Additional valves are in RHR and RHR service water systems (I. and XV. above)

5. Manual Valves: Manual connection located in screenwell - accessible under severe accident conditions.

6. Containment connection: Through RHR (I. above)

XVIII. Make-up Demineralized Water Treatment System

This system consists of a number of interconnected tanks and pumps which can provide water to the CST's or the ECCS keep-full lines. These systems are located in the Screenwell and controlled from the Rad-waste Control Room. Listed below are the major tanks and pumps, and their capacity.

Tank	Capacity (gal)	No. of Pumps	Capacity (each)	Water Source
Clarifier	87,000	overflow		Service Water (lake) Oswego city water
Clearwell	9,000	2	400 gpm @ 75 psig	Clarifier, Oswego city water
Demin H_2O (3 tanks)	25,000 (each)	2	170 gpm @ 75 psig	Clearwell

1. Power Source: Off-site power.

2. Rated Flow and Pressure: See table above (Reactor vessel injection flowrate is unknown)

3. Water Source: Tank capacities listed above. Lake Ontario and Oswego city water (also from Lake Ontario) are considered infinite sources.

4. Valve Power: Manual and Air

5. Manual Valves: Manual valves are located in the screenwell - accessible under severe accident conditions. The Rad-waste Control Room, accessed from the Screenwell, is normally staffed and is accessible under severe accident conditions.

6. Containment connection: Through ECCS systems.

NOTE 1: RHR service water pumps can provide an unlimited source of water to these RHR modes. Flowrates and pressures will differ. See XV. for RHR service water pump capabilities.

NOTE 2: Through manual valve operations, RHR can inject water from the following source to the Reactor Vessel:

a) Spent fuel pool (>150,000 gal before uncovering spent fuel)

NOTE 3: The Torus can be supplied with water from any system which takes a suction from another water supply and has either a min-flow or test line to the suppression pool. Examples include; Core Spray (from CST), HPCI or RCIC (from CST), RHR Service water (From Lake Ontario), or Diesel Fire Pump (from Lake Ontario through RHR service water).

NOTE 4: The Diesel fire pump can provide unlimited water source to the RHR service water system, which in turn can supply RHR system under station blackout conditions. Flowrates and pressures will differ. See XVI. for diesel fire pump capabilities.

ATTACHMENT B

ALTERNATE POWER SUPPLIES

The 4160 VAC safety-related and non-safety buses can be powered from any of the following sources:

(1) 345 kV switchyard
(2) 115 kV switchyard
(3) Emergency Diesel Generators

With the plant at power, the 4 kV loads are powered from the main generator through transformer T-4. When the unit is off-line, it is possible to manually align equipment to backfeed power through the 345 kV switchyard. This evolution was demonstrated during the last refueling outage and takes approximately 6 to 8 hours to complete.

Two 115 kV transmission lines enter the FitzPatrick 115 kV switchyard from opposite directions. The west line comes from Niagara Mohawk Power Corp.'s Oswego steam plant (2 oil fired boilers at ~800 MWe each) through NMPC's Nine Mile Unit 1 Nuclear Plant switchyard. The east line comes from NMPC's Lighthouse Hill pumped storage facility. This facility is a cold-start hydro plant with a dedicated transmission line to FitzPatrick. Lighthouse Hill can supply power to FitzPatrick under system blackout conditions.

FitzPatrick contains four emergency diesel generators, any one of which is capable of supplying all safe shutdown loads. Each engine has a dedicated 7 day fuel supply (full load) and separate and redundant fuel transfer capabilities from the other storage tanks.

In addition to the above, high capacity portable generating equipment is expected to be available from the local utility. Additional DC capacity/life can be assured by use of portable AC generators to power the battery chargers. (The chargers are also powered from the emergency diesel generators.)

ATTACHMENT C

EMERGENCY VENTING CAPABILITY

The ability to vent the containment is available from either the drywell or the torus vapor space. The preferred path is via the torus through schedule 40 piping to the standby gas treatment system (SBGT) and released through the 335' plant stack. This provides an elevated monitored release point. An assessment of the critical pressures as applied to venting has not been performed and therefore a plant specific failure analysis is not available.

The Torus vent path uses either of two parallel vent paths, one isolated by two large butterfly valves, and the second by two smaller MOV's. The maximum torus vent pressure is 80 psig based upon the opening characteristics of the AOV's. Without a more specific event definition, it is not possible to provide hypothetical flow rates and impact on the SBGT system or other equipment (including control room habitability).

ATTACHMENT D

CONTAINMENT SPRAY SYSTEMS

A. Drywell Sprays

1. Number of spray nozzles

   Elevation 287'-6"
   19 nozzle headers ~225 nozzles

   Elevation 311'-3"
   24 nozzle headers ~278 nozzles

   Total ~503 nozzles

2. Nozzle diameter

   Orifice diameter is 11/16"

3. Spray design

   Nozzle clusters

4) Spray Capacity

Top Header	10,950 gpm
Bottom Header	~ 9,000 gpm

Total ~19,950 gpm

B. Torus Sprays

1. Number of spray nozzles - 26
2. Nozzle diameter - ???
3. Spray design - single nozzle
4) Spray Capacity - 600 gpm

ATTACHMENT E

SECONDARY CONTAINMENT FIRE SUPPRESSION SYSTEM

Fire protection capability in the Reactor Building (secondary containment) is provided by water curtains and hazard-specific sprinklers. The water curtain systems contain open head nozzles and are actuated by temperature sensors. These fire curtains are designed to separate redundant equipment to allow safe shutdown under postulated fires (Appendix R). Hazard specific systems are of a wet-pipe fusible head design. Fire water can be provided by an electric pump, diesel driven pump, or an outside fire pumper truck through an outdoor hose connection. The electric and diesel pumps each provide up to 2,500 gpm @ 125 psig. Hookup of fire pumps to the ECCS piping is described in Attachment A, Items XVI. and XVII.

ATTACHMENT F

SURVIVABILITY OF AUTOMATIC DEPRESSURIZATION SYSTEM

Seven of the eleven Main Steam Safety/Relief valves function as the ADS system. These valves are Target Rock Corp. Model 7567F. Power to the solenoid operated pilot valves and control power is provided from both safety-related DC buses. Pneumatic power is available from nitrogen accumulators within the drywell, redundant nitrogen paths from the two liquid nitrogen storage tanks, and the instrument air system. ADS valves are expected to be operable with the drywell pressure at up to 80 psig (torus vent pressure). ADS components located in harsh environments are fully qualified for the DBA-LOCA conditions. It should be noted that NUREG-1150 indicates that DBA-LOCA conditions in the drywell might bound certain ATWS and SBO sequence predictions.